

## APPENDIX D

### HAZARDOUS MATERIALS MANAGEMENT PLAN

#### TABLE OF CONTENTS

1.0 INTRODUCTION .....	D-1
2.0 HAZARDOUS MATERIALS .....	D-2
2.1 Production Products .....	D-2
2.1.1 Natural Gas.....	D-2
2.1.2 Condensates.....	D-3
2.1.3 Produced Water .....	D-4
2.2 Construction, Drilling, Production, and Reclamation .....	D-4
2.2.1 Fuels.....	D-4
2.2.1.1 Gasoline .....	D-7
2.2.1.2 Diesel Fuel.....	D-7
2.2.1.3 Natural Gas .....	D-7
2.2.2 Lubricants .....	D-8
2.2.3 Coolant/Antifreeze and Heat Transfer Agents .....	D-8
2.2.4 Drilling Fluids .....	D-8
2.2.5 Fracturing Fluids .....	D-9
2.2.6 Cement and Additives.....	D-10
2.2.7 Miscellaneous Materials.....	D-10
2.3 Combustion Emissions .....	D-10
3.0 MANAGEMENT POLICY AND PROCEDURE .....	D-11



## APPENDIX D

### HAZARDOUS MATERIALS MANAGEMENT PLAN

#### 1.0 INTRODUCTION

The Desolation Flats Project Area (DFPA) natural gas producing operators, including Marathon Oil Company, Yates Petroleum, AEC Oil & Gas (USA) Inc., EOG Resources, Inc, Tom Brown, Inc., Basin Exploration, Inc., Questar Exploration and Production Company, Merit Energy Company, and Devon SFS Operating, Inc., (hereafter referred to as "the Operators"), propose to explore and develop natural gas reserves in the Desolation Flats Area of Carbon and Sweetwater Counties, Wyoming. The Bureau of Land Management (BLM) has prepared an Environmental Impact Statement (EIS) for the proposed project, and this Hazardous Material Management Summary (HMMS), which is included as an appendix to the EIS, provides further specific information regarding the types and quantities of hazardous and extremely hazardous materials that are expected to be produced or used for the proposed project. Detailed descriptions of the proposed action and alternatives, the potential environmental consequences, and proposed mitigation and monitoring measures are provided in the EIS.

This HMMS is provided pursuant to BLM Instruction Memoranda Numbers WO-93-344 and WY-94-059, which require that all National Environmental Policy Act (NEPA) documents list and describe any hazardous and/or extremely hazardous materials that would be produced, used, stored, transported, or disposed of as a result of a proposed project. Hazardous materials, as defined herein, are those substances listed in the Environmental Protection Agency's (EPA's) *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986*, and extremely hazardous materials are those identified in the EPA's *List of Extremely Hazardous Substances* (40 Code of Federal Regulations [CFR] 355). Materials identified on either of these lists that are expected to be used or produced by the proposed project are discussed herein.

A list of hazardous and extremely hazardous materials that are expected to be produced, used, stored, transported, or disposed of as a result of the Desolation Flats Project was obtained from DFPA operators, along with Material Safety Data Sheets (MSDS) for all chemicals, compounds, and/or substances which may be used during the construction, drilling, completion, and production operations of the proposed project. The Operators have reviewed the aforementioned EPA lists, as amended, and all materials included on either of these two lists that would be used or produced by the proposed project were identified.

Some potentially hazardous materials that may be used in small, unquantifiable amounts have been excluded from this HMMS. These materials may include: wastes, as defined by the Solid Waste Disposal Act; wood products' manufactured items and articles which do not release or otherwise result in exposure to a hazardous material under normal conditions of use (i.e., steel structures, automobiles, tires, etc.); food, drugs, tobacco products, and other miscellaneous substances (i.e., WD-40, gasket sealants, glues, etc.). No unauthorized use or disposal of these materials by project personnel would occur during project implementation, and all project personnel would be directed to properly dispose of these materials in an appropriate manner. Solid wastes generated at well locations would be collected in approved waste facilities (e.g., dumpsters), and each well location would be provided with one or more such facilities during drilling and completion operations. Solid wastes would be regularly removed from well locations and transported off the DFPA to approved disposal facilities.

## **APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN**

---

### **2.0 HAZARDOUS MATERIALS**

A listing of all relevant known hazardous and extremely hazardous materials that are expected to be used, produced, stored, transported, or disposed of during project implementation is provided herein. Where possible, the quantities of these materials have been estimated on a per-well basis and their use, storage, transport, and disposal methods described.

#### **2.1 PRODUCTION PRODUCTS**

The purpose of the proposed project is to extract natural gas from the Mesaverde/Lewis and Wasatch Formations and other formations underlying the DFPA Area. Water would also be produced as a by-product of gas and oil extraction operations. Table D-1 lists and quantifies, where possible, the hazardous and extremely hazardous materials that may be found in these production products.

##### **2.1.1 Natural Gas**

Natural gas, primarily containing methane, ethane, and carbon dioxide, would be produced from approximately 250 wells at rates averaging 0.4 million cubic feet per day (mmcf/d) per well. No extremely hazardous materials are anticipated to be produced with the gas stream; however, the hazardous material hexane (CAS Number 110-54-3) would be present in the gas stream at volumes ranging from approximately 4 to 24 thousand cubic feet per day (mcf/d) per well (Table D-1). In addition, the gas would also likely contain small amounts of potentially hazardous polycyclic organic matter and polynuclear aromatic hydrocarbons. No other hazardous materials are known to occur within the natural gas stream.

The majority of gas produced from Desolation Flats wells would be transported from each location through newly constructed pipelines linking well locations to existing or newly constructed gas processing facilities. The natural gas would eventually be delivered to consumers for combustion. Small quantities of natural gas may be vented or flared at certain well locations during well testing operations. During testing, produced gas would be vented or flared into a flare pit pursuant to BLM/Wyoming Oil and Gas conservation Commission (WOGCC) rules and regulations (Notice to Lessees [NTL]-4A). BLM and WOGCC approval would be obtained prior to flaring or venting operations. No natural gas storage is anticipated under the proposed project.

Industry standard pipeline equipment, materials, techniques, and procedures in conformance with all applicable regulatory requirements would be employed during construction, testing, operation, and maintenance of the project to ensure pipeline safety and efficiency. All necessary authorizing actions for natural gas pipelines would be addressed prior to installation. These actions include:

- Carbon and Sweetwater County special use permits,
- BLM rights-of-way (ROWs) applications,
- conformance with U.S. Department of Transportation (DOT) pipeline regulations (49 CFR 191-192), and
- Wyoming Public Service commission Certificates to act as common carrier for natural gas.

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

**Table D-1. Hazardous and Extremely Hazardous Materials Potentially Produced by the DFPA Natural Gas Project, Carbon and Sweetwater Counties, Wyoming, 2001.**

Production Product	Hazardous Constituents <sup>1</sup>	Extremely Hazardous Constituents <sup>2</sup>	Approximate Quantity Produced per Well <sup>3</sup>
Natural Gas	-- Hexane PAHs <sup>4</sup> POM <sup>5</sup>	None	0.4 mmcf 4-24 mcf
Condensates	-- PAHs POM	None	252 gpd
Produced Water	-- Lead Cadmium Chromium Radium 226 Uranium	None	168 gpd

<sup>1</sup> The hazardous constituents listed are, to the best of our present knowledge, those that are or may be present in the production products and are listed under the EPA's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986*, as amended.

<sup>2</sup> Extremely hazardous materials are those defined in 40 CFR 355.

<sup>3</sup> mmcf = million cubic feet per day.  
mcf = thousand cubic feet per day.  
gpd = gallons per day.

<sup>4</sup> PAHs = polynuclear aromatic hydrocarbons.

<sup>5</sup> POM = polycyclic organic matter.

### 2.1.2 Condensates

Condensates would be produced with the gas stream at most of the proposed wells. Condensates primarily consist of long chain hydrocarbon liquids (e.g., octanes), but may also contain variable quantities of the following hazardous materials: polycyclic organic matter and polynuclear aromatic hydrocarbons. No other hazardous or extremely hazardous materials are known to be present in the condensates. The volume of condensate produced from Desolation Flats wells is anticipated to be approximately 252 gallons per day (gpd) from most wells (Table D-1).

Condensates would be stored in tanks at well locations and centralized facilities, and all tanks would be fenced and bermed to contain the entire storage capacity of the largest tank plus one foot of freeboard as mandated by the BLM. Condensates would be periodically removed from storage tanks and transported by truck, in adherence to DOT rules and regulations, off the DFPA. All necessary authorizing actions for the production, storage, and transport of condensates, including the Oil Pollution Act of 1990 (storage of >1,000,000 gal) as necessary, would be addressed prior to the initiation of condensate production activities.

---

## **APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN**

---

### **2.1.3 Produced Water**

Produced water from Desolation Flats wells is anticipated to range in volume from 0 to 630 gpd, and would average approximately 168 gpd for most wells (Table D-1). Produced water quality from wells within the DFPA is variable and would be monitored periodically. Based on WOGCC-required water quality analyses of produced water samples from several DFPA wells, no hazardous or extremely hazardous materials are known to occur. Water from the Wasatch and Mesaverde/Lewis Mesa Verde Formations at locations in the Washakie and Great Divide Basins is known to contain the following hazardous materials: lead (CAS 7439-92-1), cadmium (CAS 7440-43-9), chromium (CAS 7440-47-3), radium 226, and uranium. However, water quality analyses of gross radiation for existing wells on the DFPA indicated only background radiation levels. No other hazardous or extremely hazardous materials are known to be present in the produced water.

Produced water would be stored in tanks at well locations and centralized facilities and would periodically be removed and transported by truck to the existing Wyoming Department of Environmental Quality (WDEQ) permitted disposal well facility. Where applicable, National Pollutant Discharge Elimination System (NPDES) permits would be obtained from the WDEQ, and produced water that meets applicable standards would be discharged to the surface at appropriate locations. All necessary authorizing actions would be met prior to the disposal of produced water including:

- BLM approval of disposal methodologies,
- RCRA compliance as necessary,
- WDEQ Water Quality Division (WDEQ-WQD) approval of wastewater disposal,
- WOGCC evaporation pond permits, and
- Wyoming State Engineer's Office (WSEO) dewatering permits (Form U.W. 5).

## **2.2 CONSTRUCTION, DRILLING, PRODUCTION, AND RECLAMATION**

Known hazardous and extremely hazardous materials planned for use during typical construction, drilling, production, and reclamation operations for the proposed project are listed in Table D-2 and are described in detail below. Hazardous and extremely hazardous materials planned for use during project implementation fall into the following categories:

- fuels,
- lubricants,
- coolant/antifreeze and heat transfer agents,
- drilling fluids,
- fracturing fluids,
- cement and additives, and
- miscellaneous materials.

### **2.2.1 Fuels**

Gasoline (CAS 8006-61-9), diesel fuel (CAS 68476-30-2), and natural gas are the fuels proposed for use on the project, and all contain materials classified as hazardous. Gasoline would be used to power vehicles providing transportation to and from South Baggs; diesel fuel would be used to power transport vehicles, drilling rigs, and construction equipment, and as a component of fracturing fluids (see Section 2.2.5); and natural gas would be used to power pipeline compressor stations.

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

**Table D-2. Hazardous and Extremely Hazardous Materials Potentially Utilized During Construction, Drilling, Production, and Reclamation Operations by the Desolation Flats Natural Gas Project, Carbon and Sweetwater Counties, Wyoming.**

Source	Hazardous Constituents <sup>1</sup>	Extremely Hazardous Constituents <sup>2</sup>	Approximate Quantity Used Per Well <sup>3</sup>
<b>Fuel</b>			
Gasoline	-- Benzene Toluene Ethylbenzene p-xylene m-xylene PAHs <sup>4</sup> POM <sup>5</sup> Tetraethyllead	--        Tetraethyllead	24,940 gal
Diesel Fuel	-- Benzene Toluene Ethylbenzene p-xylene m-xylene o-xylene Naphthalene PAHs POM	None	27,400 gal
Natural Gas	-- Hexane PAHs POM	None	
<b>Lubricants</b>	-- PAHs POM Lead Cadmium Manganese Barium Zinc Lithium	None	8 gal

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

<b>Coolant/Antifreeze and Heat Transfer Agents</b>	--	None	
	Ehylene glycol Triethylene glycol		180 gal 330 gal
<b>Drilling Fluid Additives</b>			
Caustic Soda	-- Sodium hydroxide	None	650 lbs
Lime	-- Fine mineral fibers	None	3,500 lbs
Mica	-- Fine mineral fibers	None	600 lbs
Uni-Drill	-- Acrylamide	None	50 gal
Uni-Gel	-- Fine mineral fibers	None	43,500 lbs
UNIBAR	-- Barium compounds	None	8,200 lbs
<b>Fracturing Fluid Additives</b>			
LGC-VI w/diesel fuel	-- Benzene Toluene Ethylbenzene p-xylene m-xylene o-xylene Naphthalene PAHs POM	None	953 gal
OPTI-FLO III	--- Glycol Ether	None	144 lbs
SSO-21	--- Methanol Glycol Ether	None	15 gal

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

CL-29	<div>---</div> <div>Formic acid</div> <div>Ammonium chloride</div> <div>Zirconium nitrate</div> <div>Zirconium sulfate</div>	None	59 gal
BA-20	<div>---</div> <div>Acetic acid</div>	None	38 gal
	<div>---</div> <div>Fine mineral fibers</div>	Sand	2,994 lbs
<b>Cement and Additives</b>	<div>---</div> <div>Fine mineral fibers</div> <div>PAHs POM</div>	None	>10,000 lbs
<b>Miscellaneous Materials</b>	<div>---</div> <div>Methanol</div> <div>Corrosion inhibitors</div>	None	3,000 gal

<sup>1</sup> The hazardous constituents listed are, to the best of our present knowledge, those that are or may be present in the production products and are listed under the EPA's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986*, as amended.

<sup>2</sup> Extremely hazardous materials are those defined in 40 CFR 355.

<sup>3</sup> lb = pounds

gal = gallons.

<sup>4</sup> PAHs = polynuclear aromatic hydrocarbons.

<sup>5</sup> POM = polycyclic organic matter.

### 2.2.1.1 Gasoline

Gasoline would be used to power vehicles traveling to and from the DFPA. The hazardous and extremely hazardous materials likely to be found in gasoline are listed in Table D-2. The hazardous materials present in gasoline include: benzene (CAS 71-43-2), toluene (CAS 108-88-3), ethylbenzene (CAS 100-41-4), p-xylene (CAS 106-42-3), m-xylene (CAS 108-38-3), o-xylene (CAS 95-47-6), (CAS 1634-04-4), polynuclear aromatic hydrocarbons, and polycyclic organic matter. Leaded gasoline contains tetraethyllead (CAS 78-00-2), which is listed as an extremely hazardous material (Table D-2).

### 2.2.1.2 Diesel Fuel

Diesel fuel would be used to power transport vehicles, drilling rigs, and construction equipment. The hazardous and extremely hazardous materials likely to be found in diesel fuel are listed in Table D-2. The hazardous materials present in diesel fuel include: benzene (CAS 71-43-2), toluene (CAS 108-88-3), ethylbenzene (CAS 100-41-4), p-xylene (CAS 106-42-3), m-xylene (CAS 108-38-3), o-xylene (CAS 95-47-6), (CAS 1634-04-4), naphthalene (CAS 91-20-3), polynuclear aromatic hydrocarbons, and polycyclic organic matter.

### 2.2.1.3 Natural Gas

An unknown volume of natural gas would be burned to provide power for the natural gas compressor stations required for efficient pipeline function. The natural gas used to power

## **APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN**

---

compressor stations would be produced by the proposed project, and hazardous materials contained in this natural gas are identified in Table D-2. Further detail on the transportation of natural gas as a result of the proposed project, and relevant authorizing actions for natural gas transportation, is provided in Section 2.1.1.

### **2.2.2 Lubricants**

Various lubricants, including: motor oils, hydraulic oils, transmission oils, compressor lube oils (8 gal/well), and greases, would be utilized for project-required vehicles, rigs, compressors, and other machinery. Some of these lubricants would likely contain polynuclear aromatic hydrocarbons and polycyclic organic matter, and some may additionally contain compounds of lead, cadmium, nickel, copper, manganese, barium, zinc, and/or lithium. No extremely hazardous materials are known to be present in the lubricants required for the proposed project.

The quantity of each lubricant used, stored, transported, and disposed of is unknown; however, all lubricants would be used, stored, transported, and disposed of following manufacturer's guidelines. Disposal of rags contaminated with lubricants would be in accordance with local, State, and federal requirements. No unauthorized disposal of lubricants (e.g., disposal of used motor oil) would occur in the project area.

### **2.2.3 Coolant/Antifreeze and Heat Transfer Agents**

Ethylene glycol (CAS 107-21-1) and triethylene glycol (CAS 112-27-6) would be utilized as coolant/antifreeze and heat transfer agents in association with this project (Table D-2). Ethylene glycol would be used as an engine coolant/antifreeze in automobiles, construction equipment, gas dehydrators, and drilling and workover rigs. An unspecified volume of this hazardous material would be stored and transported in engine radiators. In addition, both ethylene glycol and triethylene glycol would be used as heat transfer fluids during well completion and maintenance operations. The estimated quantity of ethylene glycol required per well for completion and maintenance operations is approximately 180 gallons for the life of the project. The quantity of triethylene glycol required would range from approximately 290 to 370 gallons/well. While the total volume of ethylene glycol to be used, stored, transported, and disposed of for the proposed project is unknown, any disposal of ethylene glycol and/or triethylene glycol would be conducted in accordance with all relevant federal and state rules and regulations.

### **2.2.4 Drilling Fluids**

Water-based muds (drilling fluids) would be used for drilling each well. Drilling fluids consist of clays and other additives that are used in standard industry procedures. Drilling fluid additives to be utilized for the proposed project include: caustic soda (650 lbs/well), cedar fibers (200 lbs/well), lime (3,500 lbs/well), mica (600 lbs/well), Uni-Drill (50 gal/well), Uni-Gel (43,500 lbs/well), UNIBAR (8,200 lbs/well), and paper (400 lbs/well) (Table D-2). All drilling operations would be conducted in compliance with applicable BLM, WOGCC, and WDEQ rules and regulations.

All known hazardous materials present in the proposed drilling fluids and additives are listed in Table D-2. These materials are: sodium hydroxide (CAS 1310-73-2), present in caustic soda; acrylamide (CAS 79-06-1), present in Uni-Drill (partially hydrolyzed polyacrylamide); barium compounds, present in UNIBAR (barium sulfate); and fine mineral fibers, present in lime, mica, and Uni-Gel (sodium montmorillonite or barite). No hazardous materials are known to occur in

## **APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN**

---

sawdust or paper, and no extremely hazardous materials are known to be present in any of the drilling fluids and additives.

Drilling fluid additives would be transported to well locations during drilling operations in appropriate sacks and containers in compliance with DOT regulations. Drilling fluids, cuttings, and water would be stored in reserve pits, and pits would be fenced to protect wildlife from exposure. Netting (1 inch mesh), to protect waterfowl, other birds and bats, and pit liners, to protect shallow groundwater aquifers, would be used on all reserve pits as deemed appropriate by the BLM.

When the reserve pit is no longer required, its contents would be evaporated or solidified in place, and the pit backfilled, as approved by the BLM. All reserve pit solidification procedures using flyash or other BLM-approved materials would be approved by the WOGCC and/or WDEQ prior to implementation. If the pH of pit residue is very high following solidification, off-site disposal may be required. In this event, or if other unanticipated contamination circumstances arise, reserve pit

contents would be removed and disposed of at an appropriate facility in a manner commensurate with all relevant state and federal regulations.

### **2.2.5 Fracturing Fluids**

Hydraulic fracturing is expected to be performed at some Desolation Flats wells to augment gas flow rates. Approximately 78,700 gallons of fracturing fluids, consisting primarily of fresh water, would be required per well for the proposed project. Fracturing fluid additives and their approximate volumes include: LGV-VI with diesel fuel (953 gal/well), GEL-STA (150 lbs/well), OPTI-FLO III (144 lbs/well), CLAYFIX II (157 lbs/well), SSO-21 (15 gal/well), CL-29 (59 gal/well), BA-20 (38 gal/well), SP BREAKER (27 lbs/well), GBW-30 (9 lbs/well), BE-5 microbiocide (36 lbs/well), and sand (299,400 lbs/well) (Table D-2).

The hazardous materials present in fracturing fluid components are listed in Table D-2 and include: benzene, toluene, ethylbenzene, p-xylene, m-xylene, o-xylene, naphthalene, polynuclear aromatic hydrocarbons, and polycyclic organic matter contained in LGC-VI with diesel fuel (hydrocarbon gel concentrate); glycol ether present in OPTI-FLO III and SSO-21; methanol (CAS 67-56-1) present in SSO-21; formic acid (CAS 64-18-6), ammonium chloride (CAS 12125-02-9), zirconium nitrate (CAS 13746-89-9), and zirconium sulfate (CAS 14644-61-2) present in CL-29; acetic acid (CAS 64-19-7) present in BA-20; and fine mineral fibers present in sand. No hazardous materials are known to be present in GEL-STA (sodium salt), CLAYFIX II (alkylated quaternary chloride), SP BREAKER (sodium persulfate), GBW-30 (cellulase enzyme carbohydrate), and BE-5 (5-chloro-2-methyl-4-isothiazolin-3-one, 2-methyl-4-isothiazolin-3-one, a microbiocide). No extremely hazardous materials are known to be present in any of the fracturing fluid additives.

Fracturing fluids and additives would be transported to well locations in bulk (e.g., LGC-VI with diesel fuel, sand) or in appropriately designed and labeled containers (e.g., OPTI-FLO III in 50 lb fiber drums; SSO-21, CL-29, and BA-20 in 55 gal drums). All transportation of fracturing fluids and additives would be in adherence with DOT rules and regulations.

During fracturing, fluids are pumped under pressure down the well bore and out through perforations in the casing into the formation. The pressurized fluid enters the formation and induces hydraulic fractures. When the pressure is released at the surface, a portion of the fracturing fluids would be forced to the well bore and up into a tank. The fracturing fluids would

---

## **APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN**

---

then be transferred to lined reserve pits and evaporated, or hauled away from the location and reused or disposed of at an authorized facility. Decisions regarding the appropriate disposal of fracturing fluids would be made by the BLM on a case-by-case basis.

### **2.2.6 Cement and Additives**

Well completion and abandonment operations would entail cementing and plugging various segments of the well bore to protect freshwater aquifers and other down-hole resources. Materials potentially used for cementing operations include: cement, calcium hydroxide, calcium chloride, pozzlans, sodium bicarbonate, potassium chloride, and insulating oil. An unknown quantity of cement and additives, which may contain the hazardous material classes of fine mineral fibers, polycyclic organic matter, and polynuclear aromatic hydrocarbons, would be transported in bulk to each well site by a qualified cement supply company. Small quantities may be transported and stored on-site in 50 pound sacks. Wells would be cased and cemented as directed and approved by the BLM (for federal minerals) and WOGCC (for state and patented minerals). No extremely hazardous materials are known to be present in the cement and additives proposed for use in this project.

### **2.2.7 Miscellaneous Materials**

Miscellaneous materials, potentially containing hazardous and/or extremely hazardous materials, that may be used for the proposed project include: methanol and corrosion inhibitors. The material would be transported to the site by qualified service and supply companies and would be used and disposed of following manufacturer's guidelines.

An unknown quantity of methanol would be used to de-ice well bores and as a hydrate deterrent during completion and natural gas transport operations. Methanol is a listed hazardous chemical and would be stored, transported, used, and disposed of in adherence with all applicable federal and state rules, regulations, and guidelines.

## **2.3 COMBUSTION EMISSIONS**

Combustion emissions from gasoline and diesel engines, as well as flaring natural gas, will occur as a result of this project. The complete oxidation of hydrocarbon fuels yields only carbon dioxide and water as combustion products; however, complete combustion is seldom achieved. Unburned hydrocarbons, particulate matter (e.g., carbon, metallic ash), carbon monoxide, nitrogen oxides, and possibly sulfur oxides would be expected as direct exhaust contaminants. Secondary contaminants would likely include the formation of ozone from the photolysis of nitrogen oxides. A listing of the hazardous and extremely hazardous materials potentially present in combustion emissions is provided in Table D-3.

Unburned hydrocarbons may contain potentially hazardous polynuclear aromatic hydrocarbons, and particulate matter may contain metal-based particulates from lead anti-knock compounds in the fuel, metallic lubricating oil additives, and engine wear particulates (Table D-3). Hazardous materials in the particulate matter may therefore include compounds of lead, cadmium, nickel, copper, manganese, barium, zinc, and /or lithium.

Nitrogen dioxide (CAS 10102-44-0), sulfur dioxide (CAS 7446-09-5), sulfur trioxide (CAS 7446-11-9), and ozone (CAS 10028-15-6) are probable combustion emissions, all classified as extremely hazardous materials. These materials would be either directly released in minor quantities from internal combustion engines, or would be formed through photolysis (i.e. ozone).

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

No releases of these or other materials would occur in excess of those allowed for Prevention of Significant

Deterioration Class II areas, WDEQ-Air Quality Division Implementation Plan; nor would releases occur that jeopardize National Ambient Air Quality Standards for Desolation Flats. Particulate matter emissions and larger unburned hydrocarbons would eventually settle out on the ground surface, whereas gaseous emissions would react with other air constituents as components of the nitrogen, sulfur, and carbon cycles.

**Table D-3. Hazardous and Extremely Hazardous Materials Potentially Present in Combustion Emissions of the Desolation Flats Natural Gas Project, Carbon and Sweetwater Counties, Wyoming, 2001.**

Emission	Hazardous Constituents <sup>1</sup>	Extremely Hazardous Constituents <sup>2</sup>
Hydrocarbons	-- PAHs <sup>3</sup>	None
Particulate Matter	-- Lead Cadmium Nickel Copper Manganese Barium Zinc Lithium	None
Gases	-- Nitrogen dioxide Sulfur dioxide Sulfur trioxide Ozone	-- Nitrogen dioxide Sulfur dioxide Sulfur trioxide Ozone

<sup>1</sup> The hazardous constituents listed are, to the best of our present knowledge, those that are or may be present in the production products and are listed under the EPA's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986*, as amended.

<sup>2</sup> Extremely hazardous materials are those defined in 40 CFR 355.

<sup>3</sup> PAHs = polynuclear aromatic hydrocarbons.

### 3.0 MANAGEMENT POLICY AND PROCEDURE

DFPA Operators and their contractors would ensure that all production, use, storage, transport, and disposal of hazardous and extremely hazardous materials as a result of the proposed project would be in strict accordance with all applicable existing, or hereafter promulgated federal, state, and local government rules, regulations, and guidelines. All project-related

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

---

activities involving the production, use, and/or disposal of hazardous or extremely hazardous materials would be conducted in such a manner as to minimize potential environmental impacts.

DFPA Operators would comply with emergency reporting requirements for releases of hazardous materials. Any release of hazardous or extremely hazardous substances in excess of the reportable quantity, as established in 40 CFR 117, would be reported as required by the *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980*, as amended. The materials for which such notification must be given are the extremely hazardous substances listed under the *Emergency Planning and Community Right to Know* Section 302 and the hazardous substances designated under Section 102 of CERCLA, as amended. If a reportable quantity of a hazardous or extremely hazardous substance is released, prompt notice of the release would be given to the BLM's Authorized Officer and all other appropriate federal and state agencies. Additionally, notice of any spill or leakage (i.e. undesirable event), as defined in BLM NTL-3A, would be given by DFPA Operators to the Authorized Officer and other such federal and state officials as required by law.

DFPA Operators have evaluated field operations in the DFPA and have or would prepare and implement multiple plans and/or policies to ensure environmental protection from hazardous and extremely hazardous materials. These plans/policies shall be available for review at the BLM Rawlins and Rock Springs field offices. These plans/policies include, where applicable:

- spill prevention and control countermeasure plans;
- oil/condensate spill response plans;
- inventories of hazardous chemical categories pursuant to Section 312 of the SARA, as amended; and
- emergency response plans.

Development operations in Desolation Flats would be in compliance with regulations promulgated under the Resource Conservation and Recovery Act (RCRA), Federal Water Pollution Control Act (Clean Water Act), Safe Drinking Water Act (SDWA), Toxic Substances Control Act (TSCA), Occupational Safety and Health Act (OSHA), and the Federal Clean Air Act (CAA). In addition, project operations would also comply with all attendant state rules and regulations relating to hazardous material reporting, transportation, management, and disposal.

Table D-4 (below) provides a generic list of hazardous chemical categories for the oil and gas exploration and production industry.

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

**Table D-4. Generic List of Hazardous Chemical Categories for the Oil and Gas Exploration and Production Industry.**

Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
<b>Acetylene Gas (CAS#74-86-2)</b>	Fire, sudden release of pressure
<b>Acids</b> Hydrochloric acid (<30%)(CAS#7647-01-0) Hydrofluoric acid (<12%)(CAS#7664-39-3) Sulfuric acid (CAS#7664-93-9)	Immediate (Acute)
<b>Alkalinity and pH Control Materials</b> Calcium hydroxide (CAS#1305-62-0) Potassium hydroxide (CAS#1310-58-3) Soda ash (CAS#497-19-8) Sodium bicarbonate (CAS#144-55-8) Sodium carbonate (CAS#497-19-8) Sodium hydroxide (CAS#1310-73-2)	Immediate (Acute)
<b>Biocides</b> Amines Glutaraldehyde (CAS#111-30-8) Isopropanol (CAS#67-63-0) Thiozolin	Immediate (Acute), Fire
<b>Breakers</b> Ammonium persulfate (CAS#7727-54-0) Benzoic acid (CAS#65-85-0) Enzyme Sodium acetate (CAS#127-09-3) Sodium persulfate (CAS#7772-27-1)	Immediate (Acute), Fire
<b>Buffers</b> Sodium acetate (CAS#127-09-3) Sodium bicarbonate (CAS#144-55-8) Sodium carbonate (CAS#497-119-8) Sodium deacetate	Immediate (Acute)
<b>Calcium Compounds</b> Calcium bromide (CAS#71626-99-8) Calcium hypochlorite (CAS#7778-54-3) Calcium oxide (CAS#1305-78-8) Gypsum (CAS#10101-41-4) Lime (CAS#1305-78-8)	Immediate (Acute)
<b>Cement (CAS#65997-15-1)</b>	Immediate (Acute)
<b>Cement Additives - Accelerators</b> Calcium chloride (CAS#10035-04-8) Gypsum (CAS#10101-41-4) Potassium chloride Sodium chloride (CAS#7647-14-5) Sodium metasilicate	Immediate (Acute)
<b>Cement Additives - Fluid Loss</b> Cellulose polymer Latex	Immediate (Acute)

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
<b>Cement Additives - Miscellaneous</b> Cellulose flakes (CAS#9004-34-6) Coated aluminum Gilsonite (CAS#12002-43-6) Lime (CAS#1305-78-8) Long chain alcohols	Immediate (Acute)
<b>Cement Additives - Retarders</b> Cellulose polymer Lignosulfonates	Immediate (Acute)
<b>Cement Additives - Weight Modification</b> Barite (CAS#7727-43-7) Bentonite Diatomaceous earth (CAS#68855-54-9) Fly ash Glass beads Hematite (CAS#1317-60-8) Ilmenite Pozzolans	Immediate (Acute)
<b>Chloride Salts</b> Calcium chloride Potassium chloride Sodium chloride (CAS#7647-14-5) Zinc chloride (CAS#7646-85-7)	Immediate (Acute)
<b>Chlorine Gas (CAS#7782-50-5)</b>	Immediate (Acute), Sudden release of pressure
<b>Corrosion Inhibitors</b> 4-4' Methylene dianiline (CAS#101-77-9) Acetylenic alcohols Amine formulations Ammonium bisulfite (CAS#10192-30-0) Basic zinc carbonate (CAS#3486-35-9) Gelatin Ironite sponge (CAS#1309-37-1) Sodium chromate (CAS#7775-11-3) Sodium dichromate (CAS#10588-01-9) Sodium polyacrylate Zinc lignosulfonate Zinc oxide (CAS#1314-13-2)	Immediate (Acute), Delayed (chronic), Fire
<b>Crosslinkers</b> Boron compounds Organo-metallic complexes	Immediate (Acute), Fire
<b>Defoaming Agents</b> Aluminum stearate Fatty acid salt formation Mixed alcohols Silicones	Immediate (Acute)

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
<b>Deflocculants</b> Acrylic polymer Calcium lignosulfonate Chrome-free lignosulfonate Chromium lignosulfonate Iron lignosulfonate Quebracho Sodium acid pyrophosphate (SAPP) Sodium hexametaphosphate (CAS#10124-56-8) Sodium phosphate (oilfos) Sodium tetraphosphate Stryene, maleaic anhydride co-polymer salt Sulfo-methylated tannin	Immediate (Acute)
<b>Detergents/Foamers</b> Amphoteric surfactant formulation Ethoxylated phenol Detergents	Immediate (Acute), Fire
<b>Explosives</b> Charged well jet perforating gun, Class C explosives Detonators, Class A explosives Explosive power device, Class B	Sudden release of pressure
<b>Filtration Control Agents</b> Acrylamide AMPS copolymer Aniline formaldehyde copolymer hydrochlorite Causticized leonardite Sulfomethylated phenol formaldehyde Leonardite Partially hydrolyzed polyacrylamide Polyalkanolamine ester Polyamine acrylate Polyanionic cellulose Potassium lignite Preserved starch Sodium carboxymethyl cellulose (CAS#9004-32-4) Starch (CAS#9005-25-8) Vinylsulfonate copolymer	Immediate (Acute)
<b>Flocculants</b> Anionic polyacrylamide	Immediate (Acute)
<b>Fluoride Generating Compounds</b> Ammonium bifluoride (CAS#1341-49-7) Ammonium fluoride (CAS#12125-0108)	Immediate (Acute)
<b>Friction Reducers</b> Acrylamide methacrylate copolymers Sulfonates	Immediate (Acute)
<b>Fuels</b> Diesel (CAS#68476-34-6) Fuel oil Gasoline (CAS#8006-61-9)	Immediate (Acute), Delayed (Chronic), Fire
<b>Gelling Agents</b> Cellulose and guar derivatives	Immediate (Acute)

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
<b>Gel Stabilizers</b> Sulfites Thiosulfates	Immediate (Acute)
<b>Hydrogen Sulfide</b> (CAS#7783-06-4)	Immediate (Acute), Fire
<b>Inert Gases</b> Carbon dioxide (CAS#124-38-9) Nitrogen (CAS#7727-37-9)	Immediate (Acute), Sudden release of pressure
<b>Lost Circulation Materials</b> Cane fibers Cedar fibers Cellophane fibers Corn cob Cottonseed hulls Mica (CAS#12001-26-2) Nut shells Paper Rock wool Sawdust	Immediate (Acute)
<b>Lubricants, Drilling Mud Additives</b> Graphite (CAS#7782-42-5) Mineral oil formulations Organo-fatty acid salts Vegetable oil formulations Walnut shells	Immediate (Acute)
<b>Lubricants, Engine</b> Motor oil Grease	Immediate (Acute)
<b>Miscellaneous Drilling Additives</b> Diatomaceous earth (CAS#68855-54-9) Oxalic acid (CAS#144-62-7) Potassium acetate (CAS#127-08-2) Zinc bromide (CAS#7699-45-8)	Immediate (Acute), Delayed (Chronic)
<b>Odorants</b> Mercaptans, aliphatic	Immediate (Acute)
<b>Oil Based Mud Additives</b> Amide polymer formulations Amine treated lignite Asphalt Diesel (CAS#68476-34-6) Gilsonite (CAS#12002-43-6) Mineral oil Organophilic clay Organophilic hectorite Petroleum distillate (CAS#8030-30-6) Polymerized organic acids Sulfonate surfactant	Immediate (Acute), Delayed (Chronic), Fire
<b>Organic Acids</b> Acetic acid (CAS#64-19-7) Acetic anhydride (CAS#108-24-7) Benzoic acid (CAS#65-85-0) Citric acid (CAS#5949-29-1) Formic acid (CAS#64-18-6) Organic acid salts	Immediate (Acute), Fire

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
<b>Preservatives</b> Dithiocarbamates Paraformaldehyde (CAS#30525-89-4) Isothiazions	Immediate (Acute)
<b>Produced Hydrocarbons</b> Condensate Crude oil (CAS#8002-05-9) Natural Gas	Immediate (Acute), Delayed (Chronic), Fire, Sudden release of pressure
<b>Proppants</b> Bauxite (CAS#1318-16-7) Resin coated sand Zirconium proppant	Immediate (Acute)
<b>Radioactive, Special Form</b> Cesium 137 (encapsulated) logging tool	Delayed (Chronic)
<b>Resin and Resin Solutions</b> Melamine resins Phenolic resins Polyglycol resins	Immediate (Acute), Fire
<b>Salt Solutions</b> Aluminum chloride (CAS#7446-70-0) Ammonium chloride (CAS#12125-02-9) Calcium bromide (CAS#17626-99-8) Calcium chloride (CAS#10035-04-8) Calcium sulfate (CAS#778-18-9) Ferrous sulfate (CAS#7782-63-0) Potassium chloride (CAS#7447-40-7) Sodium chloride (CAS#7647-14-5) Sodium sulfate (CAS#7757-82-6) Zinc bromide (CAS#7699-45-8) Zinc chloride (CAS#7646-85-7) Zinc sulfate	Immediate (Acute)
<b>Scale Inhibitors</b> Ethylenediaminetetraacetic acid (EDTA) (CAS#60-00-4) Inorganic phosphates Isopropanol (CAS#67-63-0) Nitrilotriacetic acid (NTA) (CAS#139-13-9) Organic phosphates Polyacrylate Polyphosphates	Immediate (Acute), Fire
<b>Shale Control Additives</b> Hydrolyzed polyacrylamide polymer Organo-aluminum complex Polyacrylate polymer Sulfonated asphaltic residuum	Immediate (Acute)
<b>Silica</b>	Immediate (Acute), Delayed (Chronic)

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
<b>Solvents</b> 1,1,1-Trichloroethane (CAS#71-55-6) Acetone (CAS#67-64-1) Aliphatic hydrocarbons Aromatic naphtha (CAS#8032-32-4) Carbon tetrachloride (CAS#56-23-5) Diacetone alcohol Ethylene glycol monobutyl ether (CAS#111-76-2) Kerosene (CAS#8008-20-6) Isopropanol (CAS#67-63-0) Methyl ethyl ketone (MEK) (CAS#78-93-3) Methyl isobutyl ketone (MIBK) (CAS#108-10-1) Methanol (CAS#67-56-1) t-Butyl alcohol (CAS#75-65-0) Toluene (CAS#108-88-3) Turpentine (CAS#8006-64-2) Xylene (CAS#1330-20-7)	Immediate (Acute), Delayed (Chronic), Fire
<b>Spotting Fluids</b> Nonoil base spotting fluid Oil base spotting fluid (diesel oil base) Oil base spotting fluid (mineral oil base) Sulfonated vegetable ester	Immediate (Acute), Fire
<b>Surfactants - Corrosive</b> Alcohol ether sulfates Amines Quarternary polyamine Sulfonic acids	Immediate (Acute)
<b>Surfactants - Flammable</b> Amines Ammonium salts Fatty alcohols Isopropanol (CAS#67-56-1) Oxyalkylated phenols Petroleum naphtha (CAS#8030-30-6) Sulfonates	Immediate (Acute), Fire
<b>Surfactants - Miscellaneous</b> Amine salts Glycols Phosphonates	Immediate (Acute)
<b>Temporary Blocking Agents</b> Benzoic acid (CAS#65-85-0) Naphthalene (CAS#91-20-3) Petroleum wax polymers Sodium chloride (CAS#7647-14-5)	Immediate (Acute)
<b>Viscosifiers</b> Attapulgate Bentonite Guar gum (CAS#9000-30-0) Sepiolite Xanthan gum	Immediate (Acute)

## APPENDIX D: HAZARDOUS MATERIALS MANAGEMENT PLAN

Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
<b>Weight Materials</b> Barite (CAS#7727-43-7) Calcium carbonate (CAS#1317-65-3) Galena Hematite (CAS#1317-60-8) Siderite	Immediate (Acute)